

AMENDMENTS TO THE SPECIFICATION

Please amend the paragraph, beginning on page 4, line 1, to the following paragraph:

The transistor for selection TR is formed in that portion of a semiconductor substrate 10 which portion is surrounded by a device isolation region 11, and the transistor for selection TR is covered with a first insulating interlayer 21. One source/drain region 14B is connected to the lead-out electrode 37 of the tunnel magnetoresistance device TMJ through a connecting hole 22 constituted of a tungsten plug, a landing pad 23 and a connecting hole 25 constituted of a tungsten plug. The other source/drain region 14A is connected to a sense line 16 through a tungsten plug 15. In Figure 5, reference numeral 12 indicates a gate electrode, and reference numeral 13 indicates a gate insulating film.

Please amend the paragraph, beginning on page 6, line 14, to the following paragraph:

As shown in Fig. 39, there is assumed a state where three conductor lines (L_1 , L_0 , L_2) have an infinite length, these conductor lines are placed apart side by side at a distance of d , a current of I_0 (ampere) flows in the conductor line L_0 and a current of $-I_0$ (ampere) flows in each of the conductor lines L_1 and L_2 . If distances from an arbitrary point $P(X, Y)$ to the conductor lines L_0 , L_1 , L_2 are r_0 , r_1 and r_2 , the magnetic fields H_X and H_Y in the directions of X axis and Y axis can be determined on the basis of the following expressions (3-1) and (3-2). Angles at which the straight lines connecting the arbitrary point (X, Y) and the conductor lines L_0 , L_1 , L_2 form with the X axis are θ_0 , θ_1 and θ_2 . In Fig. 39, further, the magnetic field generated by the conductor line L_0 is represented by an arrow H_0 , the magnetic field generated by the conductor line L_1 is represented by H_1 , and the magnetic field generated by the conductor line L_2 is represented by an arrow H_2 .

Please amend the paragraph, beginning on page 9, line 24, to the following paragraph:

Although it is undeniable that the values differ when boundary conditions, etc., are strictly taken into account, it can be affirmed that even the model depicted by the expression (7) gives a good approximation for the purpose of studying the distribution and magnitude of the magnetic field.

Please amend the paragraph, beginning on page 9, line 36, and continuing onto page 10, to the following paragraph:

For example, JP-A-~~2000-203388~~2002-20388 discloses a means of overcoming the above problem. In the technique disclosed in the above Japanese laid-open patent publication, programming currents (I_{WL} , I_{BL2}) are passed through a word line (WL1) and a bit line (BL2) constituting a memory cell (I_2). A compensatory current that provides a compensatory magnetic field to counteract a scattered magnetic field is passed through a word line (PWL) or a bit line (BL3, BL5) constituting at least one memory cell (I_3, I_5) adjacent to the memory cell (I_2).

Please amend the paragraph, beginning on page 21, line 19, and continuing onto page 22, to the following paragraph:

The insulating material for constituting the tunnel barrier includes an aluminum oxide (AlO_x), an aluminum nitride (AlN), a magnesium oxide (MgO), a magnesium nitride, a silicon oxide and a silicon nitride. Further, it also includes Ge, NiO, CdO_x , HfO_2 , Ta_2O_5 , BN and ZnS. The tunnel barrier can be obtained, for example, by oxidizing or nitriding a metal film formed by a sputtering method. More specifically, when an aluminum oxide (AlO_x) is used as an insulating material for constituting the tunnel barrier, the method for forming the tunnel barrier includes a method in which aluminum formed by a sputtering method is oxidized in atmosphere, a method in which aluminum formed by a sputtering method is plasma-oxidized, a method in which aluminum formed by a sputtering method is oxidized with IPC plasma, a method in which aluminum formed by a sputtering method is subject to natural oxidation in oxygen gas, a method in which aluminum formed by a sputtering method is oxidized with oxygen radicals, a method in which aluminum

formed by a sputtering method is irradiated with ultraviolet rays while it is subjected to natural oxidation in oxygen gas, a method in which aluminum is formed by a reactive sputtering method, and a method in which an aluminum oxide is formed by a sputtering method. Alternatively, the tunnel barrier can be formed by a CVD method typified by an ALD method.

Please amend the paragraph, beginning on page 29, line 31, to the following paragraph:

Fig. 39 is a model drawing for determining a magnetic field generated when three conductor lines have an infinite length and these three conductor lines are ~~places-placed~~ side by side apart at a distance of "d".

Please amend the paragraph, beginning on page 30, line 26, and continuing onto page 31, to the following paragraph:

Prior to the explanation of the nonvolatile magnetic memory device and the method of writing data into a tunnel magnetoresistance device in a nonvolatile magnetic memory device provided by the present invention, first, an example in which a magnetic field (main magnetic field) is generated by a current $g(n) \cdot I(n)$ [$g(0)$:coefficient] flowing in an n-th-place write-in conductor line (bit line or write-in word line) and magnetic fields (compensatory magnetic fields) are generated by currents $g(k) \cdot I(n)$ [$g(k)$:coefficient] flowing in q-th-place write-in conductor lines ($q = n + k$, k is $\pm 1, \pm 2, \dots$, total number of the write-in conductor lines is K , and $K = 2k_0$ when the absolute value of the values that k represents is k_0) will be explained with regard to a constitution in which a spatial FIR filter assuming magnetic fields, which are supposed to be formed in the n-th-place write-in conductor line and the q-th-place write-in conductor lines by the current $I(n)$, to be discrete pulse response and assuming the coefficients $g(0)$ and $g(k)$ to be tap-gains is constituted of the n-th-place write-in conductor line and the write-in conductor lines that are K in number (that is, the write-in conductor lines that are k_0 in number are arranged on one side of the n-th-place write-in conductor line, and the write-in conductor lines that are k_0 in number are arranged on the other side of the n-th-place write-in conductor line). A time-domain FIR filter will be explained beforehand.

Please amend the paragraph, beginning on page 33, line 20, to the following paragraph:

The tap-gain $g(k)$ of the time-domain FIR filter can be obtained on the basis of a calculation method in which the amplitude difference between the intended characteristic (Nyquist's first criterion) and the filter output is minimized. The above calculation method includes well-known calculation methods such as a method of designing a Wiener filter, a calculation method using a least-mean-square (LMS) ~~algorithm~~algorithm, a calculation method using a recursive least-mean-square (RLS) ~~algorithm~~algorithm, a calculation method using a steepest descent ~~algorithm~~algorithm and a calculation method using a learning identification method.

Please amend the paragraph, beginning on page 48, line 18, to the following paragraph:

Meanwhile, the value of $g(-2)$ and the value of $g(2)$ are the same, and the value of $g(-1)$ and the value of $g(1)$ are the same. In the following explanation, therefore, the current source for letting the current $g(-1) \cdot I_{BL}$ flow and the current source for letting the current $g(1) \cdot I_{BL}$ flow are constituted of one current source, and the current source for letting the current $g(-2) \cdot I_{BL}$ flow and the current source for letting the current $g(2) \cdot I_{BL}$ flow are constituted of one current source. This will be also applicable to Examples 2 to 5.

Please amend the paragraph, beginning on page 53, line 2, to the following paragraph:

The above-explained operation is given as an example and may be modified as required. In Examples 2 to 5, further, data can be written into tunnel magnetoresistance devices that are $M \times N$ in number, substantially by the same method.

Please amend the paragraph, beginning on page 82, line 21, to the following paragraph:

It is supposed that the normalized currents $I(n)_{BL}$ shown in the following Table 9 are passed through (or flowed in) the bit lines BL_n . Further, the following Table 9 shows the normalized

currents $i(n)_{BL}$ that are passed through (or flowed in) the bit lines BL_n and the dummy lines DL_{11} , DL_{12} , DL_{21} and DL_{22} .

Please amend the paragraph, beginning on page 88, line 7, to the following paragraph:

These "eye" pattern drawings show the following. When $\beta = (h/d) = 1.0$, if the spatial FIR filter is not constituted, the magnetic fields interfere with one another to a great extent, so that parallel-data-writing in the tunnel magnetoresistance devices is not possible. However, if at least a FIR filter of three taps is constituted, the interference of the magnetic fields is suppressed, and parallel-data-writing in the tunnel magnetoresistance devices is possible. When an FIR filter of five taps and an FIR filter of seven taps are constituted, the interference of the magnetic fields is suppressed to a greater extent.

Please amend the paragraph, beginning on page 88, line 31, and continuing onto page 89, to the following paragraph:

Further, Figs. 30, 31 and 32 show "eye" patterns when $\beta = (h/d) = 1.0$. Fig. 30 shows a superimposition of the magnetic fields generated by a random current I_{BL} or current $-I_{BL}$ (having values of ± 1) flowing in the bit lines when the eight tunnel magnetoresistance devices are arranged along the write-in word line. That is, Fig. 30 shows a superimposition of the magnetic fields before equalization. Fig. 31 shows a superimposition of the magnetic fields generated by a random current I_{BL} or current $-I_{BL}$ (having values of ± 1), as a main magnetic field generating current $\pm g(0) \cdot I_{BL}$, flowing in the bit lines and by the first compensatory magnetic field generating currents $\pm g(\pm 1) \cdot I_{BL}$ flowing in the bit lines, in a case where one dummy line DL_1 is provided outside the first bit lines, one dummy line DL_2 is provided outside the eighth bit line and the eight tunnel magnetoresistance devices are arranged along the write-in word line. That is, Fig. 31 shows a case where an FIR filter of three taps is constituted. Further, Fig. 32 shows a case where an FIR filter of three taps is constituted without providing the dummy lines. From a comparison between Fig. 31 and Fig. 32, it is seen that providing dummy lines is not essential.

Please amend the paragraph, beginning on page 117, line 1, to the following paragraph:

In ~~Examples~~the examples, the coefficients $g(0)$ and $g(k)$ assumed to be tap-gains have identical values in all of the bit lines or all of the write-in word lines. However, the coefficients $g(0)$ and $g(k)$ assumed to be tap-gains may differ between one bit line and another or between one write-in word line and another.

Please amend the paragraph, beginning on page 119, line 1, to the following paragraph:

In ~~Examples~~the examples, the coefficients $g(0)$ and $g(k)$ are used for the bit line and the write-in word line in view of explanations. However, the value of $\beta = (h/d)$ generally differs between the bit line and the write-in word line. In the above combination, therefore, different coefficients are used like $g_{BL}(0)$ and $g_{BL}(k)$ as coefficients for the bit line and $g_{RWL}(0)$ and $g_{RWL}(k)$ as coefficients for the write-in word line.